

MULE SHOE WITH INTERNAL FLOW CONTROL

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] This invention relates to downhole well tools, and in particular, to a mule shoe or Universal Bottom Hole Orientation (UBHO) sub having an internally rifled interior surface to improve fluid flow.

2. Description of the Prior Art

[0002] The Universal Bottom Hole Orientation (UBHO) Sub is used in a directional drilling BHA. The UBHO is often referred to as a mule shoe sub. This tool is typically run directly below a drill collar and contains a landing sleeve for directional survey equipment. The UBHO is designed and used to establish the “high side of the tool”, which is essential for knowing the tools orientation in the wellbore. The mule shoe aligns or orients a member being lowered into a well bore with respect to a key member extending radially inwardly with respect to the bore casing. For example, U.S. Pat. No. 2,207,505 (Bremner), U.S. Pat. No. 2,246,417 (Smith), U.S. Pat. No. 1,851,319 (McCoy), U.S. Pat. No. 3,718,194 (Hering), U.S. Pat. No. 3,363,703 (Shewmake), U.S. Pat. No. 3,052,309 (Eastman), disclose mule shoe devices.

[0003] The mule shoe sub is essentially a length of pipe situated between a stationary drill pipe and the top of the motor in the downhole end of a drill used to extract gas or oil from shale rock formations. Its function is to allow the operator to change direction of the wellbore without having to withdraw the entire apparatus in order to replace the whipstock.

[0004] A problem that often occurs with mule shoes is that the bottom pin, which is situated at the outlet of the mule shoe, is often washed out due to uncontrolled fluid flow through the sub. Accordingly, it would be desirable to provide a mule shoe that can control fluid flow therethrough.

[0005] A mule shoe or UBHO sub with internal flow control is provided. The device has a fluid flow controlling interior surface feature which produces a predictable fluid flow. Specifically, the device, which is an elongated hollow cylinder, has internal “rifling” to produce a swirling flow pattern within the device. This flow pattern reduces turbulence within the sub, and prevents washing out of the pin during heavy fluid flow.

SUMMARY OF THE INVENTION

[0006] It is a major object of the invention to provide an improved mule shoe sub.

[0007] It is another object of the invention to provide a mule shoe sub having internal flow control.

[0008] It is another object of the invention to provide a mule shoe sub with internal rifling.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 shows a perspective view of the mule shoe device of the present invention.

[0010] FIG. 2 shows a side perspective, partly in section.

[0011] FIG. 3 shows a plan view of one end of the device.

[0012] FIG. 4 shows a side sectional view of the device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0013] Referring now to FIGS. 1-4, the device of the invention is shown. It can be seen that the device, generally indicated by the numeral 10, is an elongated hollow cylinder or conduit, commonly known as a mule shoe and sometimes referred to as a sub. This device 10 is typically run directly below a drill collar and contains a landing sleeve for directional survey equipment. This sub 10 is used to establish the “high side of the tool”, which is essential for knowing the tools orientation in the wellbore.

[0014] When in use, fluid flows through the tool string (not shown) and into and through the device 10, which is positioned at the end of the tool string. As fluid flow becomes heavy, it will tend to wash out the pin 14, which will cause the device 10 to fail. Accordingly, it is desirable to control the fluid flow so that fluid turbulence does not affect the device 10. It should be noted here that this invention can be used with any downhole tool which uses a narrowing pin, as in all cases there is an issue with turbulence affecting the tool.

[0015] Referring now particularly to FIGS. 2 and 3, the inner surface 16 of the device 10 are shown. The inner surface 16 is rifled, that is, has a series of lands 18 and grooves 20 extending lengthwise. The rifling creates channels which create a swirling fluid flow. The swirling fluid flow is preferable because it reduces turbulence within the device 10 while also promoting more predictable fluid flow within the device 10.

[0016] It is to be understood that the present invention is not limited to the sole embodiment described above, but encompasses any and all embodiments within the scope of the following claims:

I claim:

1. A mule shoe for connection to a tool string in a drilling operation comprising:

an elongated hollow cylindrical main body having opposing ends;

said main body having exterior and interior surfaces, said interior surface having a series of lands and grooves extending lengthwise;

whereby fluid flow through said mule shoe is affected by said land and grooves.

2. A device for connection to a tool string in a drilling operation comprising:

an elongated hollow cylindrical main body having opposing ends;

said main body having exterior and interior surfaces, said interior surface having a series of lands and grooves extending lengthwise;

whereby fluid flow through said mule shoe is affected by said land and grooves.

* * * * *